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BAKER, DONELSON, BEARMAN & CALDWELL
Suite 900
Five Concourse Parkway
Atlanta, GA 30328

EXAMINER

CHEN, WENPENG

ART UNIT PAPER NUMBER

2624

DATE MAILED: 06/10/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/849,751

Applicant(s)

BOSTROM, ALISTAIR K.

Examiner

Wenpeng Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

Drawings

1. Although the nature of the overall subject matter sought to be patented can be understood by the text, the Examiner requires the Applicant submitting drawings (for example, flowsheets of processes) to facilitate an understanding of the claimed invention. (37 CFR 1.81)
2. A drawing is needed for the understanding of this step that "the data is padded with a linear interpolation between the last valid data element and the first" in page 9, lines 4-21. (37 CFR 1.81)

Specification

3. The disclosure is objected to because the specification is replete with errors. The specification should be checked and corrected carefully. Listed below are some examples:
 - The term "wavelets□" in page 6, line 10 shall be corrected. There are many terms followed by the symbol □.
 - Shall the term "dn" in page 10, line 32 changed to "and"?
 - Where is the reference [Fisher, p311] in page 11, line 8 referred?
 - Is the word "wee" in page 11, line 18 correct?
 - Shall f in page 12, line 1 be defined as the occurrence frequency of the original signal?Appropriate correction is required.

Claim Objections

4. Claims 1-7 are objected to because of the following informalities:

-- Shall the term "dn" in page 19, line 16 of Claim 1 changed to "and"?

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, because of the following reasons. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to implement the invention commensurate in scope with these claims.

-- The specification, while being enabling for "mapping and compaction of the code words" recited in page 19, line 30 of Claim 1, does not reasonably provide enablement for "mapping and compaction of the codebook.

-- Claim 1 recites "quantization by conversion of the floating point coefficients, output by step (a)(i)" in page 18, lines 31-32. However, step (a)(i) does not output floating point coefficients.

-- Claim 1 recites "(i) Three run Length Encoders are assigned to vertically traverse the tree, with each being assigned to certain, vertically contiguous bands of the tree, according to step (c)(i)," in page 19, lines 6-9. How can step (c)(i) is performed according step (c)(i) itself.

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6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for the following reasons.

a. Claim 1 recites "(spec 3.2)" in page 18, line 33, "(spec 3.11)" in page 19, line 12, "(spec 3.31)" in page 19, line 14, and "(spec 3.43)" in page 19, line 34. There are indefinite because nowhere in specification these sections are referred.

b. Claim 1 recites in page 18, line 35 to page 19, line 3 the feature of "(vi), wherein the separate quantization functions have been determined to be nearly optimal in rate vs. distortion for subsequent compression of most." What does "for subsequent compression of most" mean?

c. There are insufficient antecedent bases for the following limitations.

-- Claim 2 recites "a method for performing image compression as stated in claim 1." Claim 1 is a method for lossy compression of digitized images. The reference does not exactly match the method of Claim 1. Therefore the scope cannot be defined.

-- Claim 3 recites "a method of quantization as stated in claim 1." Claim 1 is a method for lossy compression of digitized images. The reference does not exactly match the method of Claim 1. Therefore the scope cannot be defined.

-- Claim 4 recites "a method of RLE coding as stated in claim 1." Claim 1 is a method for lossy compression of digitized images. The reference does not exactly match the method of Claim 1. Therefore the scope cannot be defined.

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-- Claim 6 recites "a method of entropy coding as stated in claim 1." Claim 1 is a method for lossy compression of digitized images. The reference does not exactly match the method of Claim 1. Therefore the scope cannot be defined.

-- Claim 1 recites "the floating point coefficients" in page 18, line 31-32.

-- Claim 1 recites "the codebooks built in step b" in page 19, line 26.

d. Claim 1 recites "largest word length" in page 20, line 1. Largest word length of what?

Examiner comments

8. To facilitate identification of the problems of Claims 1-7 discussed above, the Examiner highlights below the problematic areas:

"1. A method for lossy compression of digitized images, comprising the steps of,

(a) wavelet transformation of the image, with smoothing and extending to reduce high frequency contents, said step including steps of

(i) determining a linear interpolation consisting of a line, joining the first and last pixels in each row and in each column of the image,

(ii) determining how many factors of two are present in each dimension of the image,

(iii) extending these dimensions until each has at least four factors of two present,

(iv) allocating the memory needed to extend the image to the new dimensions, resulting in a memory buffer containing the image data augmented by a padding of uninitialized memory cells to the right and bottom of cells containing the image data,

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(v) joining the first and last pixels of each row and column by writing the linear interpolation function generated into the image extension padding supplied by step (iv), and (vi) performing a discrete wavelet transform on the extended image generated by steps (i) through (v), producing a quad-tree data structure which contains the wavelet transform of the image;

(b) quantization by conversion of *the floating point coefficients, output by step (a)(i)*, into a fixed alphabet (*Spec 3.2*) of L-bit integers with a separate and fixed, quantization function for each band of coefficients within the wavelet transform output by (a) (vi), wherein the separate quantization functions have been determined to be nearly optimal in rate vs. distortion for *subsequent compression of most*

(c) Run length encoding (RLE) by the following steps,

(i) Three run Length Encoders are assigned to vertically traverse the tree, with each being assigned to certain, vertically contiguous bands of the tree, *according to step (c)(i)*,

(ii) The subbands contained in each band are horizontally or vertically scanned according to the type of wavelet filter (*Spec3.11*) producing each said subband, and

(iii) Mapping by RLE of quantized coefficients by a symbol table (*Spec 3.31*) to three sets of new coefficients, each drawn from statistically similar regions of the quad-tree, representing the data *dn* zero run lengths, whereby resulting output effects improved subsequent entropy compression;

(d) Huffman entropy coding of the image data output by step (c) into three sets of coded data by

(i) Building a separate probability density function (PDF) for each of the three data sets,

(ii) Constructing a separate Huffman codebook for PDF,

(iii) Mapping the data to variable length code words using the codebooks built in *step b*. resulting in improved compression due to the similar distributions of the data sets within each of the three data sets; and

(e) Mapping and compaction of the *codebooks generated by (d)(iii) to new codebooks* wherein,
(i) The codebooks generated by (d) (iii) are mapped into new codebooks which can be implicitly stored by a sequence of codeword lengths (*Spec 3.43*), and
(ii) These lengths are stored with words whose bit length= \log_2 (Largest word length) resulting in substantial savings of storage space when compared to explicit storage of the original codebooks, thus further enhancing the benefits gained by using multiple codebooks.

2. *A method for performing image compression as stated in claim 1*, wherein linear interpolation is used in step to minimize high frequency artifacts at image boundaries.

3. *A method of quantization as stated in claim 1*, further comprising a fixed profile of the wavelet bands in conjunction with alphabet constraint to achieve a nearly optimal rate/distortion with minimal computation effort.

4. *A method of RLE coding as stated in claim 1*, further comprising RLE within each band, to better take advantage of each band's significance.

5. *A method of RLE coding as stated in claim 4*, further comprising the, per image, development of several independent RLE coders to take advantage of the statistics within the wavelet coefficient bands.

6. *A method of entropy coding, as stated in claim 1*, further comprising the per-image development of several Huffman generated codebooks which are used to advantageously exploit the statistical characteristics of the wavelet bands.

7. *A method of entropy coding, as stated in claim 6*, further comprising the use of mapping Huffman codes to significantly reduce codebook size."

9. The claims as being so indefinite in so many places as to preclude a reasonable interpretation by the examiner, examining Claims 1-7 over the prior art will be delayed until the Applicant submits an amendment which clarifies the mete and bound of Claims 1-7 so that the examiner may make a proper comparison of claims with the prior art. For example, the examiner cannot make an interpretation of Claim 2 as a dependent claim of Claim 1 or just a subcombination claim related to Claim 1.

Conclusion

10. The prior art made of record in form PTO-892. The listed prior art references are very relevant to the specification and will be relied upon for making a proper comparison of claims upon their amendments.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 703 306-2796. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703 308-7452. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular

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communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 703-306-0377.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305-4700.

Wenpeng Chen
Primary Examiner
Art Unit 2624

June 7, 2004

A handwritten signature in black ink, appearing to read 'Wenpeng Chen', with a long horizontal stroke extending to the right.